UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

IN RE CITIGROUP INC. SECURITIES LITIGATION	07 Civ. 9901 (SHS)

DECLARATION OF

PROFESSOR ALLEN FERRELL

OCTOBER 19, 2011

I. QUALIFICATIONS

1. I am the Greenfield Professor of Securities Law at Harvard Law School where I have taught since 1998. I received a Ph.D. in economics from the Massachusetts Institute of Technology with fields in econometrics and finance and a J.D. from Harvard Law School. My Ph.D. concerned the relationship between stock prices and financial disclosures.

2. I am also a faculty associate at the Kennedy School of Government at Harvard, a member of the American Law Institute Project on the Application of U.S. Financial Regulations to Foreign Firms and Cross-Border Transactions, a research associate at the European Corporate Governance Institute, and a member of the ABA Task Force on Corporate Governance.

3. I formerly was a member of the Board of Economic Advisors to the Financial Industry Regulatory Authority ("FINRA"), an executive member of the American Law School section on securities regulation, and the Chairperson of Harvard's Advisory Committee on Shareholder Responsibility (which is responsible for advising the Harvard Corporation on how to vote shares held by its endowment).

4. I have testified before the U.S. Senate Subcommittee on Securities, Insurance and Investment and presented to, among others, the Securities and Exchange Commission, the World Bank, the Structured Products Association and the National Bureau of Economic Research. I have published approximately thirty articles in leading journals including on event study methodology, materiality and the economics of securities damages. I have also been an expert witness in a variety of securities matters including on issues involving event studies, materiality and securities damages. My testimony in the last four years and academic work are summarized on my curriculum vitae, which is attached hereto as Appendix A. I am being compensated at my customary rate of $850 per hour for my work on this matter.

II. ASSIGNMENT AND SUMMARY OF CONCLUSIONS

5. I have been asked by counsel for Citigroup to assess the economic evidence regarding the materiality of the allegedly improperly disclosed information, according to the Amended Consolidated Class Action Complaint ("Complaint"), relating

to Citigroup's super-senior collateralized debt obligations ("CDO") exposure during the proposed class period of February 1, 2007 – April 30, 2008. The materials I have relied upon are listed in Appendix B. Based on my analysis, I have reached the following principal conclusions:

A. The economic evidence relied upon by plaintiffs in the Complaint, motion for class certification and expert declaration submitted in support of plaintiffs' motion for class certification fails to establish that the allegedly improperly disclosed material information concerning Citigroup's super-senior CDO exposure was material beginning as of February 2007. In fact, market indicators, such as the ABX indices relied upon by plaintiffs, are inconsistent with the materiality of the allegedly improperly disclosed information prior to the dramatic market disruptions that occurred in the fall of 2007.

B. Plaintiffs have failed to identify any statistically significant Citigroup stock price drop after November 5, 2007 that indicates that the market price of Citigroup stock was inflated by allegedly improperly disclosed material information concerning Citigroup's super-senior CDO exposure subsequent to November 5, 2007. The materiality of this information cannot rest solely on Citigroup's stock price drop of January 15, 2008 given that, first, the total mix of information by this point included the projection of substantial 4Q 2007 Citigroup write-downs and, second, other negative information concerning Citigroup was also simultaneously released on January 15, 2008.

I explain the bases for these conclusions below.

III. BACKGROUND

6. I understand that plaintiffs seek certification of a class of persons (excluding insiders) who acquired Citigroup common stock from February 2007 through April 2008 and suffered damages as a result of allegedly improperly disclosed material information regarding Citigroup's super-senior CDO exposure during this period.

7. A CDO is a structured-credit vehicle that issues securities backed by a pool of assets, which could include anything from corporate loans to mortgage-backed

securities. A CDO distributes the cash flows from its asset portfolio to the holders of its various liabilities in prescribed ways that take into account the characteristics of those securities. CDOs can be structured to issue notes with various characteristics by changing certain structural features, including the quality and type of the collateral chosen, the characteristics of the capital structure and the rules determining the distribution of funds to noteholders.[1]

8. Within a single CDO, one of the key factors in determining the relative safety of various notes is the relative amounts of subordination of the notes. As a general rule, subordination determines the priority of payment to the notes, with more senior notes paid first. The most senior notes issued by a CDO are often referred to as super-senior notes. Super-senior notes were protected by more subordination than any other notes in the capital structure, and therefore were generally protected from more loss than other notes in the capital structure.

9. As described in the Complaint, at the time of issuance, Citigroup's super senior CDO exposure was not expected to experience any loss unless the security suffered losses in excess of four times the expected loss (Complaint, ¶84). The CDOs were collateralized primarily by residential mortgage backed securities. Citigroup had exposure to these securities in three different ways: direct ownership, contingent claims in the form of liquidity puts, and exposure that was hedged through monoline insurers.[2]

10. According to the Complaint, defendants misled investors by improperly disclosing the nature and extent of Citigroup's exposure to super-senior tranches of CDOs. Among other things, plaintiffs allege that Citigroup's disclosures regarding its involvement in CDOs in the variable interest entity ("VIE") footnote to the Company's annual and quarterly SEC filings were misleading because they failed to specify the precise amount of Citigroup's super-senior exposure or distinguish among CDOs and other forms of VIEs (Complaint, ¶¶543-545, 560-569). In addition, plaintiffs allege that Citigroup's disclosures regarding "Securitizations and Variable Interest Entities," which described the "total assets of unconsolidated VIEs where the Company has significant

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[1] For a detailed explanation of CDOs and their various features, see Douglas J. Lucas, Laurie S. Goodman & Frank J. Fabozzi, Collateralized Debt Obligations: Structures and Analysis, Second Edition, (2006).
[2] See comments by Gary Crittenden, Citigroup Conference Call, November 5, 2007.

involvement" were misleading because they distinguished between "CDO-type transactions" and "Mortgage-related transactions" (Complaint, ¶545), thus implying, according to plaintiffs, that CDOs did not involve mortgage-related risk. The Complaint further alleges that Citigroup's valuation of its super-senior CDO tranches at par until September 30, 2007 was "materially false and misleading" in light of "numerous, observable, relevant indicators of CDOs' fair value [that] made clear that such value was deeply impaired" (Complaint, ¶594).

11. On November 4, 2007 (a Sunday) Citigroup disclosed that "it was holding $43 billion of subprime CDO super senior tranches" and announced that it anticipated write-downs of the market value of those securities in the range of $8 to $11 billion. (Complaint, ¶¶131, 1217). Plaintiffs allege that this announcement was a corrective disclosure and was associated with a price decline on November 5, 2007 (Complaint, ¶1212).

12. After November 4, 2007, the remaining alleged corrective disclosures concern the quantification of Citigroup's monoline hedges on January 15, 2008 (Complaint, ¶¶185-187) and additional write-downs of the super-senior positions on January 15, 2008 and April 18, 2008 due to the "belated incorporation of ABX index valuations" into Citigroup's valuation of its super-seniors (Complaint, ¶624).

IV. ANALYTICAL FRAMEWORK

13. Plaintiffs are seeking certification of a class of shareholders who acquired Citigroup common stock in the public market during a time period in which plaintiffs allege the share price was "inflated" by allegedly material misrepresentations and omissions. They seek certification under the "fraud on the market" doctrine, which allows a plaintiff in an action under Rule 10b-5 to prove reliance on an alleged material misrepresentation or omission indirectly through reliance on the integrity of the market price.

14. I understand from counsel that, as a legal matter, in order to invoke the "fraud on the market" presumption of reliance, a plaintiff must demonstrate that the allegedly improperly disclosed information at issue is "material." As a matter of

economics, this makes sense; in an efficient market, all material public information is reflected in the market price. Therefore, by transacting at the market price, a market participant can rely indirectly on material public information about which he or she may not be aware.

15. For this theory to hold, however, the information in question must be material. Information that is not material would not be expected to have a discernable effect on the market price, and reliance on the market price cannot therefore serve as an economic proxy for reliance on that information. Thus, the Complaint alleges that "dissemination of the materially false and misleading information and failure to disclose material facts [ ] artificially inflated the market price of Citigroup's common stock during the Class Period." (Complaint, ¶1257.) I understand from counsel that plaintiffs must establish the accuracy of this allegation by a preponderance of the evidence before a class may be certified under the "fraud on the market" theory.

16. As an economic matter, however, it appears that plaintiffs have made no effort to establish that the allegedly improperly disclosed information during the proposed class period was material (and thereby led to inflation of the market price of Citigroup stock during that period). Plaintiffs' expert, Dr. Jarrell, opines only on the general efficiency of the market for Citigroup stock, not whether any alleged misrepresentation or omission was material.

17. To explore the materiality of the allegedly improperly disclosed information, I will consider the economic evidence relied upon by plaintiffs in the complaint, motion for class certification and Dr. Jarrell's declaration as well as other related economic evidence.

18. With regard to Dr. Jarrell's declaration, I will focus on the results of his event study. An event study is a statistical analysis that can identify movements in a stock price that cannot be explained solely by reference to the stock's historical relationship to market (or industry) movements. An event study is a useful tool for determining the efficiency of the public market for an issuer's securities because it can show how rapidly the market reacts to company-specific news. An event study is also a useful tool for examining the materiality of an alleged misrepresentation or omission (although Dr.

Jarrell has not used it for this purpose). An event study can help determine whether the release of allegation-related information, either an alleged misrepresentation or a corrective disclosure, moved the market. If so, a stock price movement can potentially be evidence of the materiality of that information. Indeed, as I have discussed in a previous paper, "[e]vent study analysis is a ubiquitous tool in assessing . . . the 'materiality' of misstatements or fraudulently omitted information."[3]

19. I therefore use, where relevant, the results of Dr. Jarrell's event study in order to assess the economic evidence of materiality of the alleged misrepresentations and omissions identified in the Complaint during the proposed class period. In so doing, I will assume that Dr. Jarrell's event study was conducted properly, without taking a position on that issue.

20. In addition, in the course of assessing the economic evidence of materiality, I also consider other related economic evidence that can shed light on the market relevance of the alleged misrepresentations and omissions.

V. PLAINTIFFS FAIL TO ESTABLISH THAT THE ALLEGEDLY IMPROPERLY DISCLOSED INFORMATION WAS MATERIAL PRIOR TO FALL 2007

21. The Complaint states: "Citigroup valued its super senior CDO holdings substantially at par, or full, value up until September 30, 2007. This was materially false and misleading throughout, but especially in late 2006 and throughout 2007, when numerous observable, relevant indicators of CDOs' fair value made clear that such value was deeply impaired" (Complaint, ¶594). To assess this allegation, and more specifically whether the economic evidence establishes materiality prior to Fall 2007, it is necessary to understand the evolution of the financial crisis and how this intersected with the market relevance of banks' super-senior CDO exposures.

22. The turmoil in financial markets in the second half of 2007 (and in 2008) led to the most severe financial crisis since the Great Depression. The dramatic market events associated with the credit crisis caused substantial market volatility and made it increasingly difficult for even the most sophisticated market participants to value

[3] Ferrell, Allen, and Saha, Atanu, "The Loss Causation Requirement for Rule 10b-5 Causes of Action: The Implications of *Dura Pharmaceuticals v. Broudo,*" 63 BUS. LAWYER 163, (2007), p.166.

subprime-related portfolios.[4] The changing state of the markets, and particularly the housing market, over the course of 2007 is therefore directly relevant to assessing the market relevance of highly rated exposures to the housing market at different points in time.

1. The Housing Market Downturn in Late 2006 and Early 2007

23. The crisis originated in a relatively small sector of U.S. housing: subprime mortgages.[5] It spread from that sector to structured products—such as residential mortgage-backed securities (RMBS) and CDOs—that were based on subprime mortgages and its impact ultimately was felt throughout the entire financial system.[6] As housing prices declined, subprime loans began to lose value, as did the structured products created out of pools of those mortgages. Those products were sold in over-the-counter markets and to institutional investors, including financial institutions like Citigroup, which subsequently had exposure to declines in the value of those products.

24. As Exhibit 1a shows, the decline in housing prices started in late 2006.[7] Such nationwide declines in housing prices had been quite rare from at least 1969 until that point. On the few occasions that housing prices had declined—as, for example, in the

[4] See, e.g., Mizen, Paul (2008), "The Credit Crunch of 2007–2008: A Discussion of the Background, Market Reactions, and Policy Responses," *Federal Reserve Bank of St. Louis Review*, September/October 2008, 90(5), pp. 531–67; Gorton, Gary (2008), "The Panic of 2007," Prepared for the Federal Reserve Bank of Kansas City, Jackson Hole Conference, August 2008; and Brunnermeier, Markus K. (2009), "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives* 23(1), pp. 77–100.

[5] Subprime mortgages are loans made to a borrower with low or no credit. These are typically adjustable rate mortgages (ARM), i.e., they have a fixed rate for the first few years and then reset to an adjustable rate for the remainder of the loan. This structure increases the likelihood that the borrower refinances after the fixed period ends because rates typically increase significantly after reset. In times of rising home prices, the borrower can easily refinance his loan at a lower rate because he then has more collateral (the increased equity of the home). Decreasing home prices significantly increase the likelihood that the borrower will default, especially if the borrower is "underwater," i.e., the loan is larger than the market price of the home. Unless the lender expects the value of the home to increase in the next few years, the lender will be hesitant to refinance the loan. The structure of subprime loans makes them vulnerable to decreases in housing prices. See Gorton (2008); Mayer, Chris and Karen Pence (2008), "Subprime Mortgages: What, Where, and to Whom?" Finance and Economics Discussion Series, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C., Working Paper 2008-29; and Cutts, Amy Crews and Robert Van Order (2005), "On the Economics of Subprime Lending," *The Journal of Real Estate Finance and Economics* 30(2), pp. 167–96.

[6] See generally Gorton (2008).

[7] Housing prices are measured as the year-over-year change in monthly median prices of existing single family homes using data from the National Association of Realtors. I use the National Association of Realtors data because it covers a longer time period (1968 – present) than the alternatives, the S&P/Case-Shiller index (1987–present) and data from the Office of Federal Housing Enterprise Oversight (OFHEO)—now published under the Federal Housing Finance Agency (FHFA).

early 1990s—the declines had quickly reversed themselves. As Exhibit 1b shows, the decline that started in late 2006 continued until January 2007, but slowed considerably in February 2007. At that time, prices even started to increase in some regions, such as the Northeast.[8] The pattern of price movements through August 2007 was consistent with prices stabilizing, as had historically been the case. As a result, it was not foreseeable at this point that the housing decline would turn into one of the greatest housing crises in U.S. history. Moreover, data on housing indicators were released with a lag, making it more difficult for decision makers to understand the true extent of the unprecedented deterioration in housing markets in real time.[9] For example, data from the Office of Federal Housing Enterprise Oversight ("OFHEO"), were released quarterly until 2008, with an average lag of two months. Thus, as of November 4, 2007, OFHEO data, for instance, would have only been available for 2Q 07, since data for 3Q 07 were released on November 29, 2007.[10] On a similar note, the National Association of Realtors ("NAR") did not release housing data for September 2007 until October 24, 2007 and housing data for October 2007 until November 28, 2007.[11]

25. As Exhibit 2a shows, consistent with the decline in housing prices, residential mortgage delinquencies and foreclosures also increased to historically unprecedented levels in 4Q 07. Between 1Q 79 and 2Q 07, an average of 1.73% of mortgages had been "seriously delinquent."[12] The percentage of "seriously delinquent" mortgages increased to 2.95% in 3Q 07 and to 3.62% in 4Q 07—more than twice the historical average. Exhibit 2b shows that the percentage of "seriously delinquent" subprime mortgages similarly showed a continued increase in 4Q 07, followed by yet

[8] Based on regional data from the National Association of Realtors.
[9] Data from NAR is reported on a monthly basis with an average lag of approximately one month. (see http://web.archive.org/web/20071126072031/www.realtor.org/Research.nsf/Pages/EHSdata http://web.archive.org/web/20071026084908/http://www.realtor.org/press_room/news_release_schedule.html). S&P/Case-Shiller Index data are released with an average lag of two months.
[10] OFHEO data were released quarterly until 2008 and monthly thereafter, with an average lag of approximately two months. http://www.fhfa.gov/Default.aspx?Page=195&ListNumber=0&ListYear=2007#Year_2007
[11] See http://web.archive.org/web/20071026084908/http://www.realtor.org/press_room/news_release_schedule.html.
[12] The percentage of "seriously delinquent" mortgages is calculated by Haver Analytics by adding the percentage of mortgage payments 90 days or more past due to the percentage of the inventory of mortgages in foreclosure, using data from the Mortgage Bankers Association. Data show an average of 1.73% between 1Q 79 and 2Q 07, with a minimum of 0.73% and a maximum of 2.47%.

further increases over the following two years.[13] Subprime foreclosures started (measured as a percent of the total number of mortgages) also increase substantially, from 2.45% in 2Q 07 to historically unprecedented levels of 3.18% in 3Q 07 and 3.71% in 4Q 07 (see Exhibit 2b).[14] As with housing data, data on delinquencies were generally not available in real time. For example, data on the unprecedented increase in delinquencies in 3Q 07 were not released by the Mortgage Bankers Association until December 6, 2007.[15]

26. Even as the markets began to observe a significant decline in housing prices and an increase in delinquencies, the economic evidence indicates that many market participants considered super-senior subprime-related securities—the most senior tranches of subprime-related securities—to be safe investments. As discussed in the Complaint, "[t]he standard for triple-A ratings require[d] securities be able to withstand losses four times greater than expected" (Complaint, ¶84). As the super senior tranches were also senior to a AAA tranche, they were even further protected from the expected loss. As Patrick Parkinson, the then-Deputy Director of the Division of Research and Statistics of the Fed, testified in February 2008, the super-senior tranches of CDOs "would suffer credit losses only if the losses on the underlying collateral were so severe that all other tranches, including some tranches rated AAA, were wiped out. The possibility of such severe credit losses was seen as remote, and these securities indeed have suffered little or no credit losses to date."[16] Contemporaneous analysis supports this statement.

27. The timing of the housing market downturn is consistent with evidence regarding the downward pressure on prices for subprime-related securities, as reflected in movements in ABX indices. The ABX indices started trading in January 2006 and are maintained by Markit Group Ltd. They comprise five sub-indices of securities with ratings of AAA, AA, A, BBB and BBB–. The ABX indices can be used as proxies for the

[13] Historical data breaking out subprime and prime mortgages are available starting in 1Q 98.
[14] Foreclosures started is the number of loans for which foreclosure proceedings were started in the current quarter and includes deeds received "in lieu" of foreclosure and loans assigned directly to FHA, VA, or other insurers, or investors (See "National Delinquency Facts," Mortgage Bankers Association).
[15] Data on delinquencies and foreclosures from the Mortgage Bankers Association is released quarterly with an average lag of approximately two months. (See, e.g., http://www.mortgagebankers.org/NewsandMedia/PressCenter/58758.htm)
[16] Patrick Parkinson, Deputy Director of the Division of Research and Statistics of the Federal Reserve in testimony given before the Subcommittee on Capital Markets, Insurance, and Government Sponsored Enterprises, Committee on Financial Services, U.S. House of Representatives, "Bond insurance," February 14, 2008.

value of the subprime-related securities underlying each index.[17] This does not indicate in any way, however, that the ABX indices are an appropriate proxy for specifically valuing Citigroup's super-senior CDO portfolio. Markit has produced four vintages of ABX indices, ABX.HE-06-1, ABX.HE-06-2, ABX.HE-07-1 and ABX.HE-07-2. The -1 and -2 refer to first half and second half of the calendar year, respectively. Exhibit 3a shows the AAA, A and BBB ABX indices for the 06-1 vintage.[18] I use the 06-1 ABX index to demonstrate downward pressure on subprime-related securities. As depicted by the exhibit, the indices declined starting in July 2007 and partially recovered in September 2007. This recovery was reversed in October 2007 and the indices continued declining through November 2007. While these indices showed some signs of recovery in the first two weeks of December 2007, they continued to decline thereafter. The same pattern is present in the 06-2 ABX index as illustrated in Exhibit 3b.

28. The Complaint relies on the values of the ABX indices to substantiate the allegation that Citigroup's super-senior CDO exposures were at risk and incorrectly valued at par prior to September 30, 2007. The value of the various ABX indices, however, does not support a finding of materiality prior to fall of 2007. As I discussed in one of my academic papers, "the value of the ABX indexes associated with AAA MBS does not experience a sharp deterioration until the second half of October 2007. While

[17] Each ABX index is based on a basket of 20 credit default swaps ("CDS") referencing ABS containing subprime mortgages with the relevant rating. The indices are based on daily closing prices for the underlying CDS provided by a consortium of market makers, which included at the time: Bank of America, BNP Paribas, Deutsche Bank, Lehman Brothers, Morgan Stanley, Barclays Capital, Citigroup, Goldman Sachs, RBS, Greenwich Capital, UBS, Bear Stearns, Credit Suisse, JPMorgan, Merrill Lynch, and Wachovia. An investor who wants to insure against the default of the basket of underlying securities pays a periodic fee which is set to guarantee an index price of 100 at the initiation of each series (each index is reconstituted every six months according to pre-specified rules). As the perceived risk of subprime mortgages increases, the ABX index declines in value such that an investor who wants to buy protection against the default of the basket of underlying securities now has to pay a higher upfront fee (equal to 100 – current ABX price). For more detailed explanations of the ABX index see, for example, Gorton (2008); Brunnermeier (2009); Longstaff, Francis A. (2010), "The Subprime Credit Crisis and Contagion in Financial Markets," *Journal of Financial Economics* 97, pp. 436–50; and http://www.markit.com/en/products/data/indices/structured-finance-indices/abx/abx.page.

[18] While Citigroup had exposures to 2006 and 2007 vintages of subprime-related securities, my understanding is that its exposure was tilted toward vintages 2005 and earlier (See, for example, the November 5, 2007 conference call. Gary Crittenden commented, "a pretty significant portion of what we have done is 2005 vintages and earlier."). Subprime-related securities with vintages from 2005 and earlier years tended to perform better than those with later vintages because the underlying mortgages likely benefited from price appreciation in the years immediately following origination and were able to be refinanced (see, for example, Gorton (2008), pp. 31–34). No ABX index is available with a vintage prior to 2005. Since Citigroup's exposure was tilted towards vintages from 2005 and earlier, I use the earliest possible ABX vintages (the 06-1 and 06-2 vintages).

there was a relatively modest dip experienced in late July and August 2007, most of the lost value was recovered by September 2007."[19] This fact can be seen in Exhibit 3.

29. Industry studies in early 2007 also demonstrate the market's perception of low risk to the AAA securities. For example, a Moody's analysis in March 2007 came to the conclusion that in the worst case, "the senior Aaa tranche remains investment-grade."[20] Similarly, an IMF study published in April 2007 commented that industry stress tests showed that "tranches rated A and higher would not face losses unless house prices fell 4 percent per year for five years."[21]

30. Consistent with the economic evidence presented above, the academic literature on the credit crisis indicates that the severity of the housing market downturn in 4Q 07 and the associated losses it caused took the market by surprise. For example, in an effort to determine if economists were able to predict the housing crisis, Gerardi et al. (2010) survey the research conducted by economists prior to the housing market crash.[22] They find that, prior to the crisis, economists were not able reach a consensus regarding the existence of a housing bubble. While some were skeptical and pointed to bubble-like phenomena in certain regional markets, many doubted that a bubble existed in housing prices. The authors observe that "[t]he small number of economists who argued forcefully for a bubble often did so years before the housing market peak, and thus lost a fair amount of credibility," and conclude that "the state-of-the-art tools of economic science were not capable of predicting with any degree of certainty the collapse of U.S. house prices that started in 2006."[23]

31. Goetzmann et al. (2009) employ econometric models to study the effect of past housing price movements on mortgages. They find that models using housing data

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[19] Ferrell, Allen and Atanu Saha (2009), "Securities Litigation and the Housing Market Downturn," 35 *Journal of Corporation Law* 97, 118.
[20] "The Impact of Subprime Residential Mortgage-Backed Securities on Moody's-Rated Structured Finance CDOs: A Preliminary Review", Moody's Investor Service, March 23, 2007, p. 7.
[21] "Global Financial Stability Report: Market Developments and Issues", International Monetary Fund, April 2007, p. 6.
[22] Gerardi, Kristopher S., Christopher L. Foote, and Paul S. Willen (2010), "Reasonable People Did Disagree: Optimism and Pessimism About the U.S. Housing Market Before the Crash," Federal Reserve Bank of Boston Discussion Paper No. 10-5.
[23] Id., p. 22.

"up to 2006 predicted future price increases and low probabilities of an extreme crash in home values."[24]

32. Similarly, an article I co-authored with Atanu Saha (2009) analyzes the foreseeability of the housing downturn based on historical economic data. Our review of regional and national housing prices, housing sales, housing futures contracts, and various market spreads, is consistent with the view that, despite weakness in late 2006 and early 2007, the severe and unprecedented housing downturn was in fact generally not foreseen by market participants prior to 4Q 07.[25]

2. Deteriorating Conditions in Financial Markets in Fall 2007

33. The housing market downturn did not auger a full-blown credit crisis until August 9, 2007, when BNP Paribas announced that it had halted redemptions at three investment funds, which was associated with a dramatic jump in the TED spread.[26] Various markets subsequently experienced substantial disruptions. For instance, Exhibit 4 shows that, after steadily increasing through 2Q 07, global CDO issuances declined dramatically between 2Q 07 and 4Q 07.[27] During that period, CDO issuances backed by structured finance collateral decreased by 81.6%, and CDO issuances backed by all other collateral decreased by 67.3%. The decreases continued over the next few quarters such that by the end of 2008 there were virtually no CDO issuances.[28]

34. Starting in October 2007, adverse developments in the markets led to massive downgrades of existing tranches of structured products by credit rating agencies. As Exhibit 5 shows, the number of downgrades continued at historically unprecedented

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[24] Goetzmann, William, Liang Peng, and Jacqueline Yen (2009), "The Subprime Crisis and House Price Appreciation," Working Paper, p.16.
[25] Ferrell, Allen and Atanu Saha (2009), "Securities Litigation and the Housing Market Downturn," 35 *Journal of Corporation Law* 97.
[26] See "Legal and Economic Issues in Litigation arising from the 2007-2008 Credit Crisis," with Jennifer Bethel and Gang Hu, in PRUDENT LENDING RESTORED: SECURITIZATION AFTER THE MORTGAGE MELTDOWN (Brookings Institution Press 2009) The TED spread is calculated as the difference between the three-month LIBOR (the rate banks charge when lending to other banks in the unsecured London interbank lending market) and the three-month T-bill interest rate. The TED spread is often interpreted as an indicator of the perceived difference between the risk associated with lending to a bank and that associated with lending to the federal government.
[27] Data on CDO issuances from SIFMA is quarterly and is released with an average lag of approximately two months. For example, data for 3Q 07 was released on November 29, 2007. (http://web.archive.org/web/20071216064501/www.sifma.org/research/research_reports.html)
[28] See also Mizen (2008).

levels through November and December 2007 and intensified even further in January 2008. The notional value of the downgraded tranches reveals a similar pattern. In October 2007 the U.S. subprime and mortgage related securities downgraded by all three agencies (Fitch, Moody's, and Standard & Poor's) had total notional value of approximately $165.1 billion. In November 2007, those agencies downgraded more tranches with a notional value of $110.8 billion. And in December 2007, they downgraded yet more tranches with a notional value of $314.9 billion.[29]

35. The withdrawal of liquidity from the interbank market caused the Fed to decrease the federal funds rate by 25 bps on December 11, 2007.[30] On December 12, 2007, the Fed also announced a new program called the Term Auction Facility ("TAF") to help provide liquidity to the markets.[31] For banks, TAF was similar to borrowing from the Fed's discount window, except that they could do so anonymously.[32] The Fed's goal was to "help promote the efficient dissemination of liquidity when the unsecured interbank markets are under stress" by injecting "term funds through a broader range of counterparties and against a broader range of collateral."[33] Eventually the Fed would extend this program and introduce additional programs in an attempt to restore liquidity to the markets.[34] Recently released data by the Fed show that two TAF auctions were held

[29] Oppenheimer, "Citigroup Shakes Global Money Tree For Spare Change To Shore Up Capital Base," January 16, 2008. Note that the Oppenheimer report presents the sum of the notional amounts downgraded by all three rating agencies (p. 11). Since some tranches may have been downgraded by more than one agency, these numbers likely overstate the notional amounts that were downgraded. Regardless, the Oppenheimer report indicates a substantial increase in downgrades in 4Q 07, especially in December 2007.

[30] Brunnermeier (2009), p. 87; Federal Reserve Press Release December 12, 2007. http://www.federalreserve.gov/newsevents/press/monetary/20071212b.htm

[31] Federal Reserve Press Release December 12, 2007. http://www.federalreserve.gov/newsevents/press/monetary/20071212a.htm

[32] Brunnermeier (2009), p. 87. Cecchetti (2008) notes that TAF "helps to ensure anonymity for the banks and that the bidders will not be branded as being in desperate need of immediate funds […] As a result, banks have been willing to bid in the auction in a way that they have refused to use the more traditional "discount window" or primary credit facility." (Stephen G. Cecchetti (2008), "Crisis and Responses: The Federal Reserve and the Financial Crisis of 2007-2008," NBER Working Paper 14134, p. 14). In addition Cecchetti (2008) noted that "[t]he rules of the Term Auction Facility allow banks to pledge collateral that might otherwise have little market value. Under the rules of the auctions, TAF loans must be over-collateralized by at least a factor of two, but in reality the Fed is taking collateral at a price that is almost surely above its actual market price […] The result is two-fold. First, liquidity reaches places where it wasn't going on its own, which helps to address potential liquidity constraints on individual institutions; and second, banks gain the time they need to value the assets they have." Cecchetti (2008), p. 15.

[33] Federal Reserve Press Release December 12, 2007. http://www.federalreserve.gov/newsevents/press/monetary/20071212a.htm

[34] TAF auctions increased in size from $20 billion in December 2007 to $30 billion in January 2008 and to $75 billion in July 2008. See Mizen (2008), p. 547; Federal Reserve Press Release January 4, 2008;

during December 2007, with $20 billion of loans extended in each auction.[35] Overall, more than $3.8 trillion of loans were extended to banks under the TAF facility through March 11, 2010.[36]

36. Uncertainty regarding the impact of the credit crisis on banks created major concerns in the fall of 2007 about counterparty risk in the interbank lending market. Banks became unwilling to lend, helping to prompt a liquidity crisis. Their unwillingness to lend to each other and the "flight to quality," *i.e.*, the desire to put funds into U.S. Treasuries, manifested themselves in historically unprecedented increases in the LIBOR-OIS spread[37] and the TED spread, measures of counterparty and insolvency risk in the interbank lending market (see Exhibit 6). The LIBOR-OIS spread (which averaged 12 bps from December 2001 to August 2007) spiked in early September 2007 to approximately 90 bps before declining through September and October. Similarly, the TED spread (which averaged 29 bps from December 2001 to August 2007) spiked in August 2007 to approximately 240 bps before declining through September and October and then increasing during the remainder of 4Q 07. Consistent with this, spreads on bank CDS—i.e., the cost of insurance against bank defaults—widened considerably in 4Q 07, indicating a substantial increase in market participants' perception of banks' riskiness (see Exhibit 7).[38]

37. Not only did financial markets experience substantial deterioration starting in the fall of 2007, but they also became increasingly volatile. Exhibit 8 shows the Chicago Board of Options Exchange Volatility Index ("VIX"),[39] illustrating heightened volatility in financial markets starting in August 2007. The VIX began to return to normal

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http://www.federalreserve.gov/newsevents/press/monetary/20080104a.htm; and Federal Reserve Press Release July 15, 2008. http://www.federalreserve.gov/newsevents/press/monetary/20080715a.htm
In addition, on March 7, 2008 the Fed announced a 28-day repurchase program that would allow borrowers to use—among other types of securities—mortgage-backed securities to obtain short-term liquidity. Federal Reserve Press Release March 7, 2008.
http://www.federalreserve.gov/newsevents/press/monetary/20080307a.htm

[35] http://www.federalreserve.gov/newsevents/reform_taf.htm

[36] Id.

[37] The LIBOR-OIS spread is calculated as the difference between LIBOR and the overnight indexed swap rate. This spread can be an indicator of the health of the banking system. See Thornton, Daniel L. (2009), "What the Libor-OIS Spread Says," Economic Synopses, Federal Reserve of St. Louis, Number 24.

[38] Mizen (2008).

[39] The VIX is a measure of market expectations of near-term volatility measured using S&P 500 Index option quotes. For more details see http://www.cboe.com/micro/vix/introduction.aspx#03Method and "The CBOE Volatility Index – VIX," CBOE, 2009.

levels in October, only to rise again in November 2007. This pattern repeated itself as the VIX decreased slightly in the beginning of December 2007, only to increase again in January 2008.

38. The effect of changing market conditions on the market relevance of super-senior exposures can also be seen in market commentary. I reviewed the news and market commentary on super-senior CDOs during the February 1, 2007 – October 31, 2007 time period. The results of this review are documented in Exhibit 9a.[40] This commentary indicates widespread concerns over super-senior positions beginning only in the fall of 2007. Indeed, super-seniors were largely not discussed (and when discussed they were not discussed as a source of concern) prior to the fall of 2007. On a similar note, comparable banks to Citigroup began reporting, as can be seen in Exhibit 9b, losses and write-downs on their super-senior positions only in the fall of 2007, such as Merrill Lynch's October 24, 2007 announcement.[41]

39. Consistent with the economic evidence presented above, Donald Kohn, Vice Chairman of the Fed, testified before the U.S. Senate on March 4, 2008 regarding the unpredictability of the credit crisis: "I do not know that we fully appreciated all of these risks out there. I am not sure anybody did, to be perfectly honest. … These are very unusual events … it would have been hard to see a year ago where we are today."[42]

40. The timing of the market disruptions in the fall of 2007 and thereafter is consistent with Dr. Jarrell's identification of October 2007 – April 2008 time period as marked by a substantial increase in both market and industry volatility (Jarrell, ¶21). It is also consistent with the lack of a statistically significant stock price reaction on July 20, 2007 when Citigroup disclosed, among other things, that it had $13 billion in subprime exposure as a result of its secured lending activities (Jarrell, Exhibit 4).

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[40] I searched financial and business publications for the keyword "super senior." The publications searched included such major news sources such as Dow Jones Newswire, Wall Street Journal, New York Times, Financial Times, Economist, Barron's, and Reuters. The search returned 29 articles which were then reviewed for news of super senior CDO exposure or write-downs.

[41] I selected top ten banks with the largest write-downs during 2007 as identified by Bloomberg. These ten banks are: Merrill Lynch, UBS, Morgan Stanley, Bank of America, HSBC Holdings, J.P. Morgan, Credit Suisse, Wachovia, Washington Mutual, and Barclays.

[42] Donald Kohn in Testimony before the U.S. Senate Committee on Banking, Housing, and Urban Affairs, March 4, 2008, pp. 50 and 55–56.

41. Plaintiffs otherwise fail to account for any of the economic evidence regarding the timing of the credit crisis in general, and the timing of the impairment of super-senior CDO positions in particular. Plaintiffs have not identified economic evidence showing that prior to the fall of 2007 the market would have viewed the alleged information concerning Citigroup's super-senior exposure as material.

VI. PLAINTIFFS FAIL TO ESTABLISH MATERIALITY POST-NOVEMBER 5, 2007

42. Dr. Jarrell's event study finds a statistically significant price movement in Citigroup's stock price on only two of the purported corrective disclosure days identified in the Complaint: November 5, 2007 and January 15, 2008 (See Exhibit 10). Dr. Jarrell's own event study, therefore, is inconsistent with extending the class period beyond January 15, 2008. Furthermore, for reasons I will detail below, one cannot establish that Citigroup's stock price was inflated by material misrepresentations and omissions related to CDOs during the November 5, 2007 – January 15, 2008 period merely by pointing to a stock price decline on January 15, 2008.

43. The last alleged corrective disclosure date on which Dr. Jarrell's event study identifies a statistically significant price reaction is January 15, 2008, a full three months prior to the proposed end of the class period. In fact, Dr. Jarrell's event study finds a statistically insignificant, but *positive* return on the last of plaintiffs' alleged corrective disclosure dates, April 18, 2008, when "Citigroup announced a net loss for the first quarter of 2008 of $5.1 billion, including $6 billion in subprime related write-downs, $1.5 billion in ARS write-downs, $1 billion in Alt-A RMBS write-downs and $3.1 billion in leveraged loan write-downs" (Complaint, ¶1229).

44. This lack of a market reaction to any purported corrective disclosure after January 15, 2008 concerning Citigroup's super-senior CDOs is inconsistent from an economic perspective with the materiality of this information post-January 15, 2008.

45. In addition, I have not seen any economic evidence offered by plaintiffs to support the conclusion that the price decline observed on January 15, 2008 establishes the materiality of the Citigroup super-senior CDO-related disclosures made that day.

46. On January 15, 2008, Citigroup announced its fourth-quarter and full-year 2007 results, including $18 billion in super-senior CDO write-downs (as opposed to the $8-11 billion projected on November 4) and $10.5 billion of super-senior CDO positions that had been hedged with monoline insurers. The Complaint alleges that this constituted a corrective disclosure (Complaint, ¶185; see also ¶1224). According to Dr. Jarrell's event study, the price reaction on this day is statistically significant.

47. It does not follow, however, that a statistically significant price movement on January 15, 2008 establishes that Citigroup's stock price had, prior to that date, been inflated by previously-undisclosed material information relating to Citigroup's super-senior CDO positions. Indeed, drawing such a conclusion would be speculative for at least two reasons.

48. First, the economic evidence provides substantial reasons to question whether the January 15, 2008 CDO-related disclosures were in fact "new" to the market. As discussed more fully in the previous section, the market continued to deteriorate after Citigroup's November 4, 2007 announcement that it anticipated an $8-11 billion write-down based upon information at the time and that Citigroup had exposure that was hedged through the monolines. As can been seen from the ABX indices and the other market indicators discussed above, market conditions worsened over the November 4, 2007 – January 15, 2008 period. A severe recession began in the U.S. in December, 2007.[43]

49. As a result of worsening conditions, several analysts had already expected Citigroup's write-down would increase to around $18 billion prior to January 15, 2008. On December 26, 2007, Goldman Sachs predicted an $18.7 billion Citigroup write-down, a higher estimate than the actual write-down announced on January 15, 2008.[44] The Buckingham Research Group, CIBC, Lehman Brothers, Credit Suisse, Merrill Lynch and Bear Stearns all issued reports with similar write-down estimates ($16-18 billion) prior to the January 15, 2008 announcement by Citigroup. Exhibit 11 contains quotes from these

[43] "Determination of the December 2007 Peak in Economic Activity," *National Bureau of Economic Research*, available at http://www nber.org/cycles/dec2008.html.
[44] There was no price reaction to this report on December 26, 2007 (Jarrell, Exhibit 4).

analyst reports which discuss the deteriorating market conditions that caused them to increase their write-down estimates.

50. Second, the company disclosed negative information unrelated to CDOs on January 15, 2008. The Complaint acknowledges that there were other Citigroup disclosures besides the announced $18 billion write-down on January 15, 2008, including "a $7.5 billion loan loss reserve provisioning charge, including [ ] a $4.1 billion increase in credit costs in U.S. Consumer primarily related to higher current and estimated losses on consumer loans" (Complaint, ¶1224).

51. The relevance of these two issues – market anticipation of the CDO-related information that was disclosed and other negative information released on the same day – is confirmed by market commentary on the January 15, 2008 disclosures. The announced write-down, according to a news story at the time, "did not come as much of a surprise."[45] In response to the January 15 announcement, in fact, market commentators focused on other aspects of Citigroup's earnings release. On the other hand, the $4.1 billion loan loss reserve relating to Citigroup's U.S. consumer exposure was viewed as a negative surprise. For instance, on January 15, 2008 Goldman Sachs stated that the write-down was "what we expected" but the "results were much worse than anticipated due to a higher than expected reserve build in the consumer segment"[46] Additional market commentary to the January 15, 2008 announcement is documented in the Panel A of Exhibit 12.

52. As a further inquiry, I also reviewed the commentary of the six analysts I was able to identify who cut their 2008 earnings per share estimates for Citigroup in response to the January 15, 2008 announcement. Five of the six analysts specifically identified "higher credit costs" or "higher loss provisions in U.S. mortgages" as purported reasons for their EPS revision. None of the six analysts cited Citi's subprime write-downs (or monoline exposure) as a reason for their EPS revision. This analyst commentary is documented in Panel B and C of Exhibit 12.

[45] "Jump in Citi's Credit Costs Shocks Analysts," *Financial Times*, January 15, 2008.
[46] Goldman Sachs, "Taking its medicine but the illness will not go away, lowering EPS", January 15, 2008.

53. Given these issues, it would be speculative to simply attribute the negative statistically significant price decline on January 15, 2008 to the purported corrective disclosure related to Citigroup's super-senior CDO exposure on that date and establish materiality on this basis.

VII. CONCLUSION

54. For the reasons above, the economic evidence relied upon by plaintiffs fails to establish that the allegedly improperly disclosed material information was material beginning as of February 2007. In fact, market indicators, such as the ABX indices relied upon by plaintiffs, are inconsistent with the materiality of the allegedly improperly disclosed information prior to the dramatic market disruptions that occurred in the fall of 2007. Nor do plaintiffs identify economic evidence demonstrating that the market price of Citigroup stock was inflated by improperly disclosed information relating to CDOs at any time after November 5, 2007.

55. I declare under penalty of perjury under the laws of the United States of America that the forgoing is true and correct.

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Greenfield Professor of Securities Law, Harvard Law School

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Faculty Associate, Kennedy School of Government

Research Associate, European Corporate Governance Institute

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Massachusetts Institute of Technology, Ph.D. in Economics, 2005
Fields in econometrics and finance

Harvard Law School, J.D., 1995, *Magna Cum Laude*

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- Editor, *Harvard Law Review*

Brown University, B.A. and M.A., 1992, *Magna Cum Laude*

PREVIOUS POSITIONS

Harvard University Fellow
Harvard Law School, 1997

Law Clerk, Justice Anthony M. Kennedy
Supreme Court of the United States; 1996 Term

Law Clerk, Honorable Laurence H. Silberman
United States Court of Appeals for the District of Columbia; 1995 Term

COURSES TAUGHT

Securities Regulation
Regulation of Market Structure
Law and Finance
Law and Corporate Finance
Contracts

REFEREE FOR FOLLOWING JOURNALS

Quarterly Journal of Economics
American Law and Economics Review
Journal of Corporation Finance
Journal of Law, Economics and Organization
Journal of Legal Studies

TALKS

Third Annual Structured Products Association Meeting, "Current Policy Issues Concerning Structured Products"

Annual Boston Analysts Society Meeting, "The Regulation of Structured Products"

Chairperson, Asian Exchange Conference, Singapore, "Issues Facing Asian Exchanges"

U.S. Senate Subcommittee on Securities, Insurance and Investment, "The Regulation of Cross-border Exchange Mergers"

Joint NASD/SEC Forum, "Law and Economics of Best Execution"

SEC Panel, "Econometrics of Measuring the Effects of Mandatory Disclosure"

American Enterprise Institute/Brookings Institution, "Shareholder Rights"

Brookings Institution, "Financial Innovation"

International Development Law Institute, "Corporate Law and Development"

World Bank, "Financial Market Development Indicators"

Shenzhen Stock Exchange, "Regulation of Insider Trading"

Numerous presentations at the National Bureau of Economic Research

Papers

"Thirty Years of Shareholder Rights and Firm Valuation," with Martijn Cremers, Yale ICF Working Paper No. 09-09, *revise and resubmit at Journal of Finance*

"Forward-casting 10b-5 Damages: A Comparison to other Methods" with Atanu Saha, Working Paper (2011)

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"Federalism and Takeover Law: The Race to Protect Managers from Takeovers," with Lucian Bebchuk, 99 *Columbia L. Rev.* 1168 (1999)

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Nacco Industries, et al. v. Applica Incorporated, et al, Case No. 2541-N; Expert Report and deposition on December 15, 2010

Black Horse Capital, et al. v. JP Morgan Chase Bank, et al., Case No. 08-12229; Expert Report and deposition on November 28, 2010

SEC v. John Kelly, Case No. 4612; Expert Report and deposition on May 17, 2010

In re Schwab Corp. Securities Litigation, Case No. 08-cv-1510, Expert Report and deposition on January 15, 2010

In re Ticketmaster Entertainment Shareholder Litigation, Lead Case No. BC407677, Expert Report and deposition on December 3, 2009

In re Boston Scientific, Civil Action No. 1:05-CV-11934, Expert Report and deposition on October 13, 2009

In re Emulex Shareholder Litigation, Civil Action No. 4519-VCS: Expert Report and deposition on June 30, 2009

Selectica v. Trilogy, Civil Action No. 4241-VCN: Trial testimony on April 30, 2009

Selectica v. Trilogy, Civil Action No. 4241-VCN: Expert Report and deposition on February 25, 2009

In re Centerline Holding Company Securities Litigation, Civil Action No. 08-CV-00505: Expert Report and deposition on December 4, 2008

Ehrlich, Schlichtmann, v. Kerry et al., Civil Action No. 06-1403-BLS: Expert Report and deposition on November 7, 2008

In Re Mutual Funds Investment Litigation: Parthasarathy v. RS Investment Management, L.P., Civil Action No. 04-CV-3798-JFM: Expert Report and deposition on June 24, 2008

UnitedGlobalCom Shareholders Litigation, Civil Action No. 1012-N: Expert Report and deposition on November 15, 2007

Appendix B: Materials Relied Upon

Court Documents

- Amended Consolidated Class Action Complaint, filed February 24, 2009
- Opinion & Order, filed November 9, 2010
- Plaintiffs' Memorandum of Law in Support of Their Motion for Class Certification, filed July 15, 2011
- Declaration of Gregg A. Jarrell, filed July 15, 2011

SEC Filings/Forms

- Citigroup Inc. 10-K, February 23, 2007
- Citigroup Inc. 10-Q, May 4, 2007
- Citigroup Inc. 10-Q, August 3, 2007
- Citigroup Inc. 10-Q, November 5, 2007
- Citigroup Inc. 10-K, February 22, 2008
- Citigroup Inc. 10-Q, May 2, 2008

Security Data

- ABX and TABX Indices obtained from Markit
- Housing, home, and regional prices data obtained from National Association of Realtors
- Mortgage Data obtained from Mortgage Bankers Association (MBA)
- Data on worldwide CDO issuances obtained from Securities Industry and Financial Markets Association (SIFMA)
- Term Auctions Facility (TAF) data obtained from Federal Reserve Board
- Market and financial data obtained from Bloomberg, L.P.

News and Analyst Reports

- News articles obtained from Factiva and Bloomberg, L.P.
- Analyst reports obtained from Counsel and Thomson Reuters Corp.

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Appendix B: Materials Relied Upon (continued)

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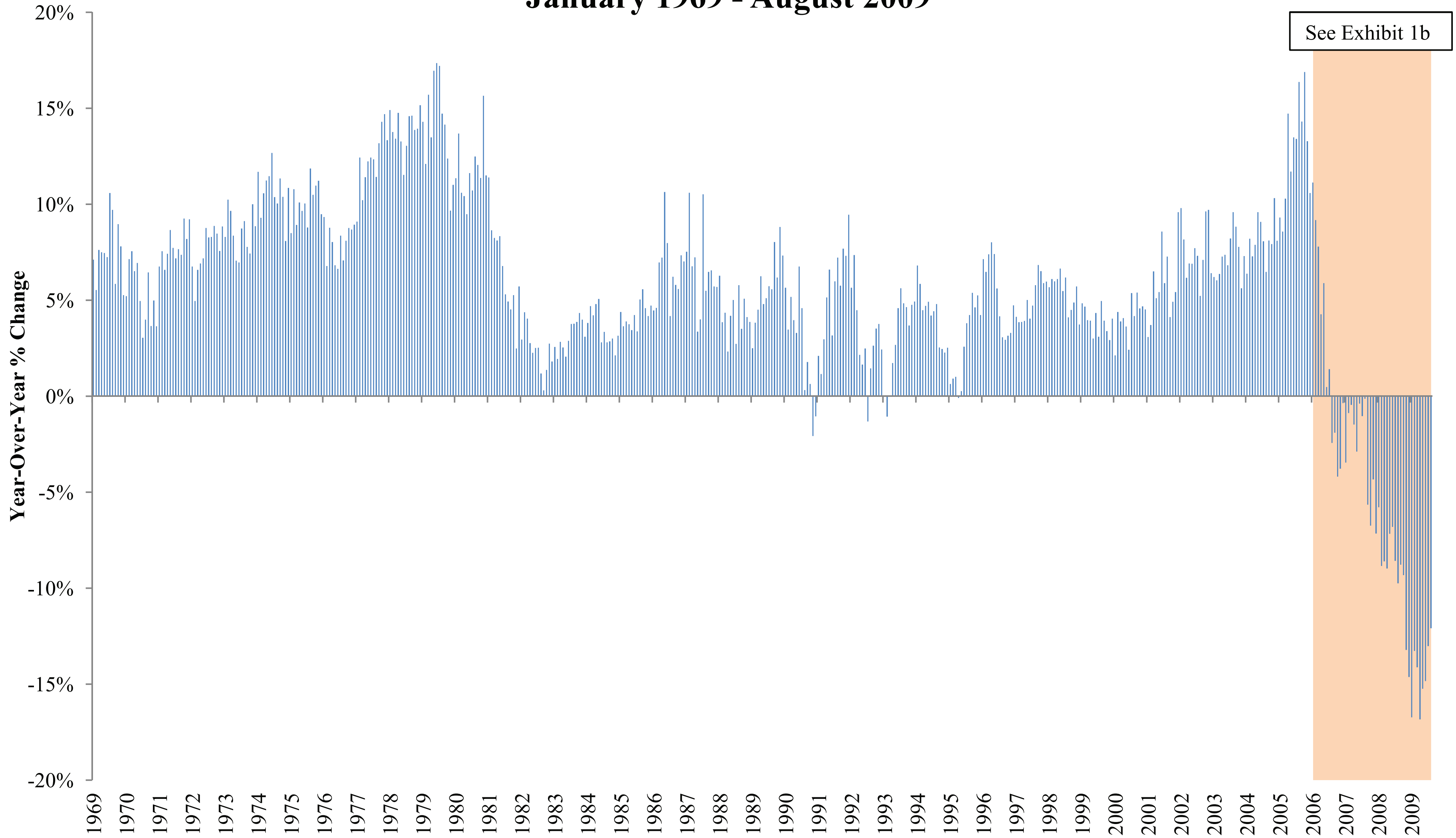
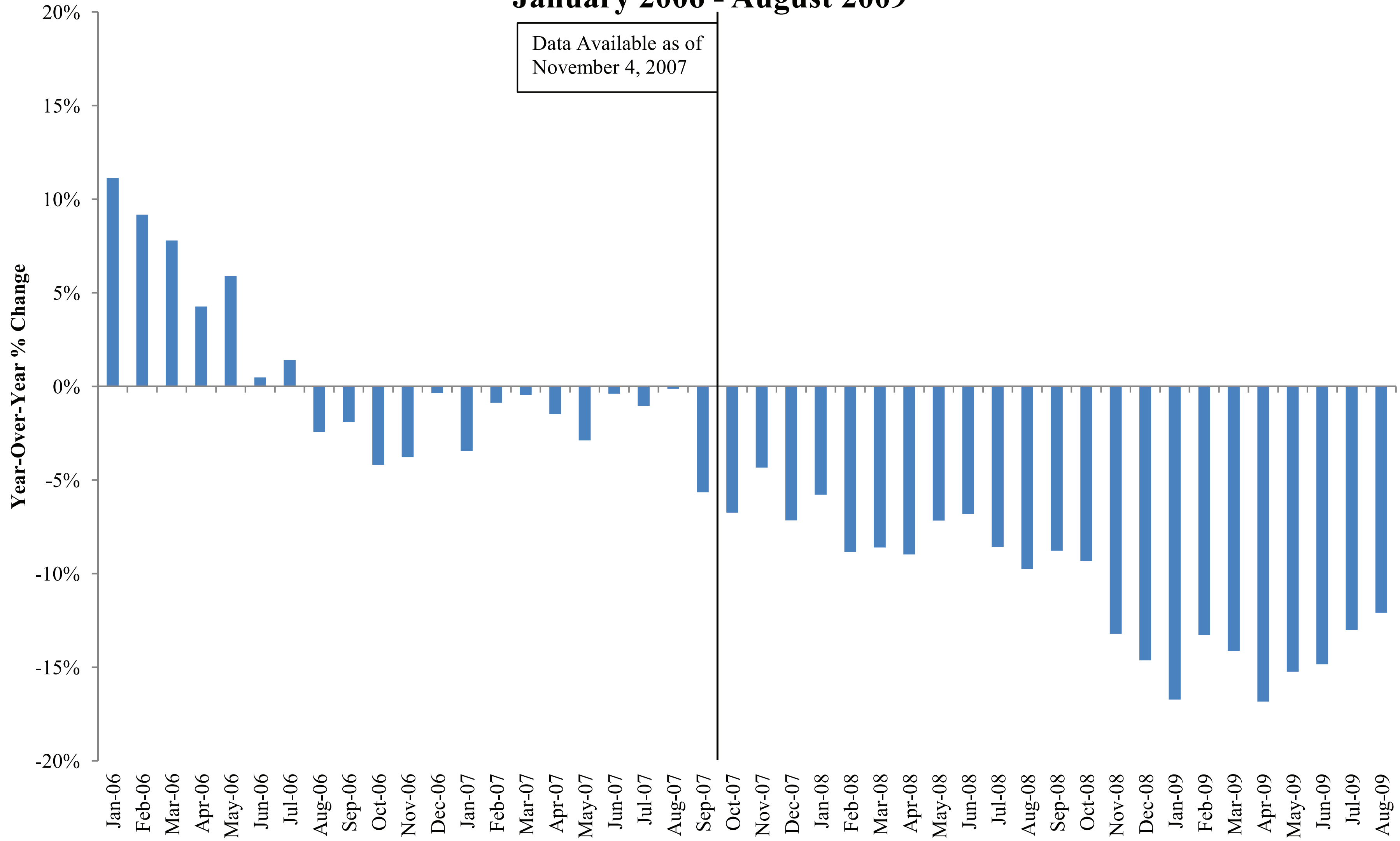
All other material cited in the text of the Report or Exhibits.

Exhibit 1a. Year-Over-Year % Change in Monthly Median Housing Prices of Existing Single Family Homes
January 1969 - August 2009



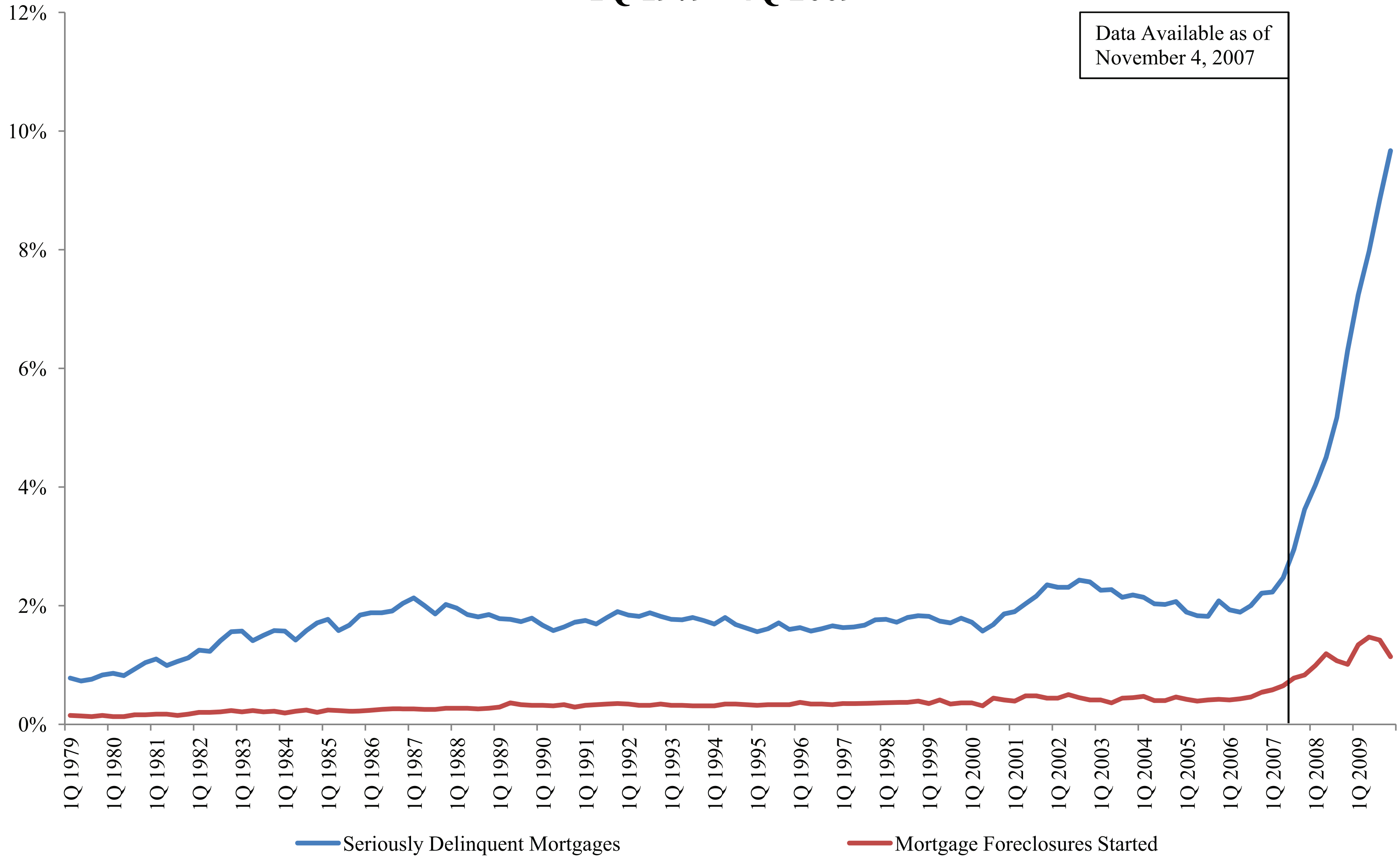
Source: National Association of Realtors.

Exhibit 1b. Year-Over-Year % Change in Monthly Median Housing Prices of Existing Single Family Homes
January 2006 - August 2009



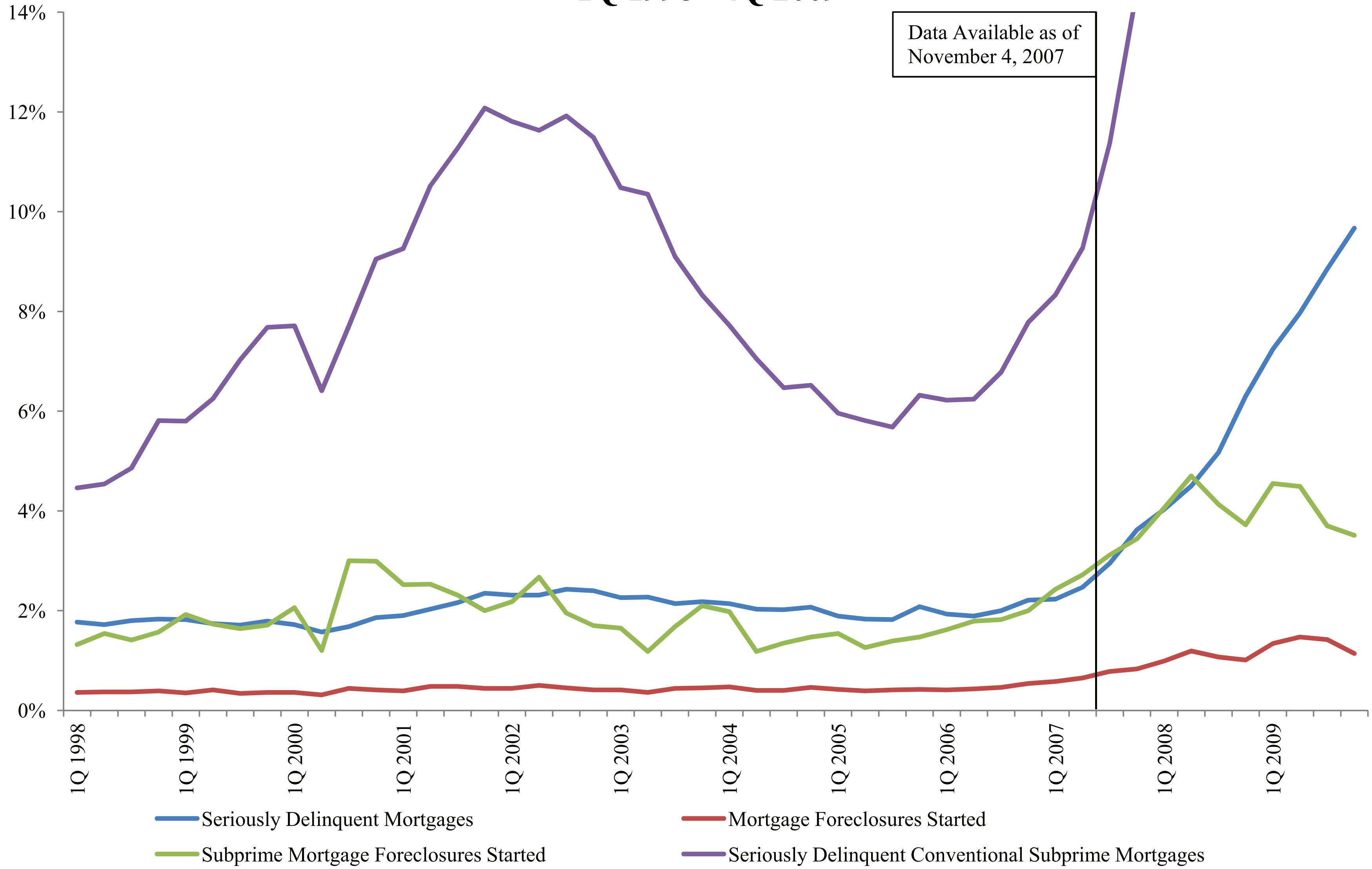
Source: National Association of Realtors.

Exhibit 2a. Percent of Seriously Delinquent Mortgages and Mortgage Foreclosures Started
1Q 1979 - 4Q 2009



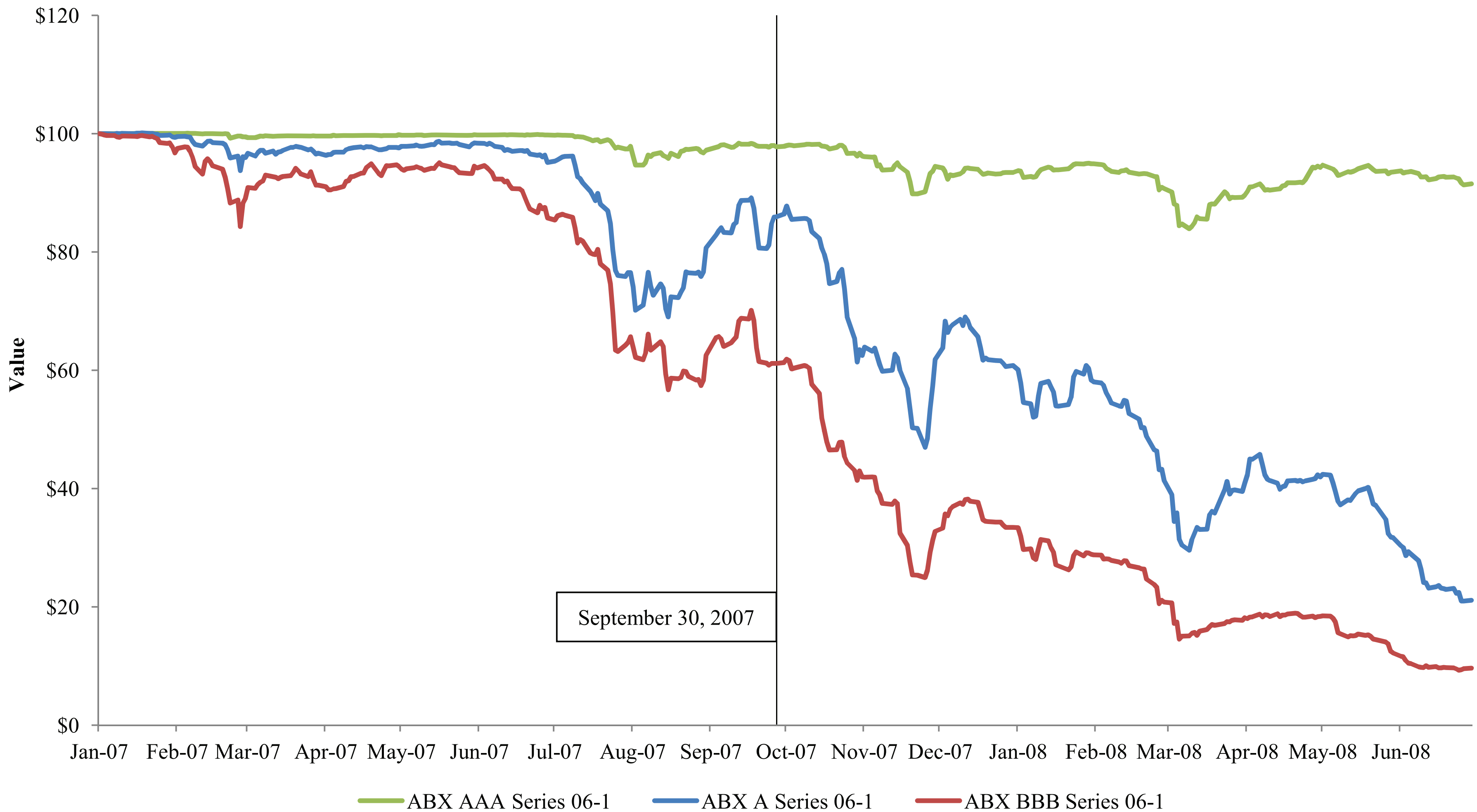
Source: Mortgage Bankers Association.

Exhibit 2b. Percent of Seriously Delinquent Mortgages and Mortgage Foreclosures Started
1Q 1998 - 4Q 2009



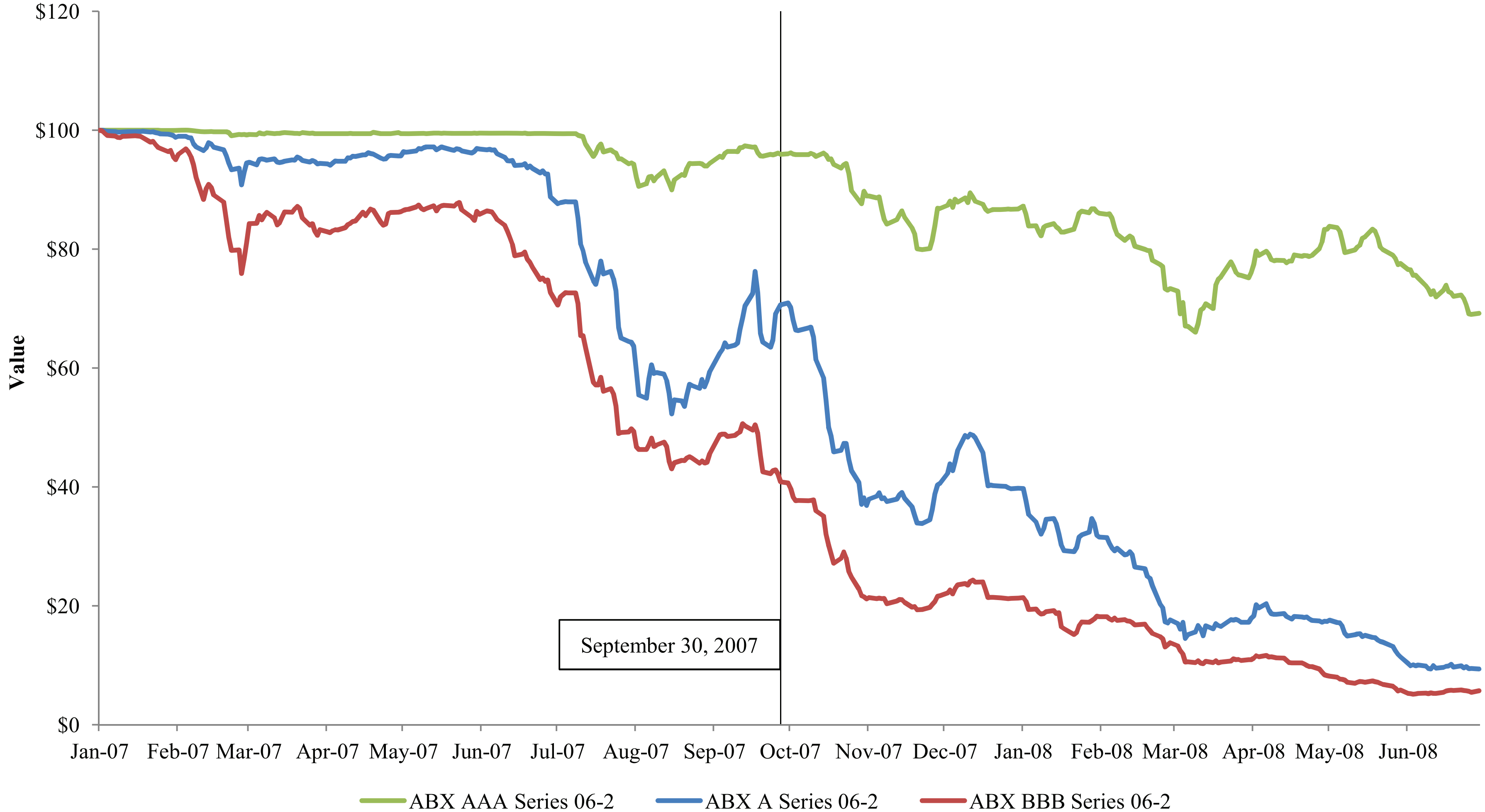
Source: Mortgage Bankers Association.

Exhibit 3a. Value of $100 Invested in the ABX Series 06-1 Indexes
Q1 2007 - Q2 2008



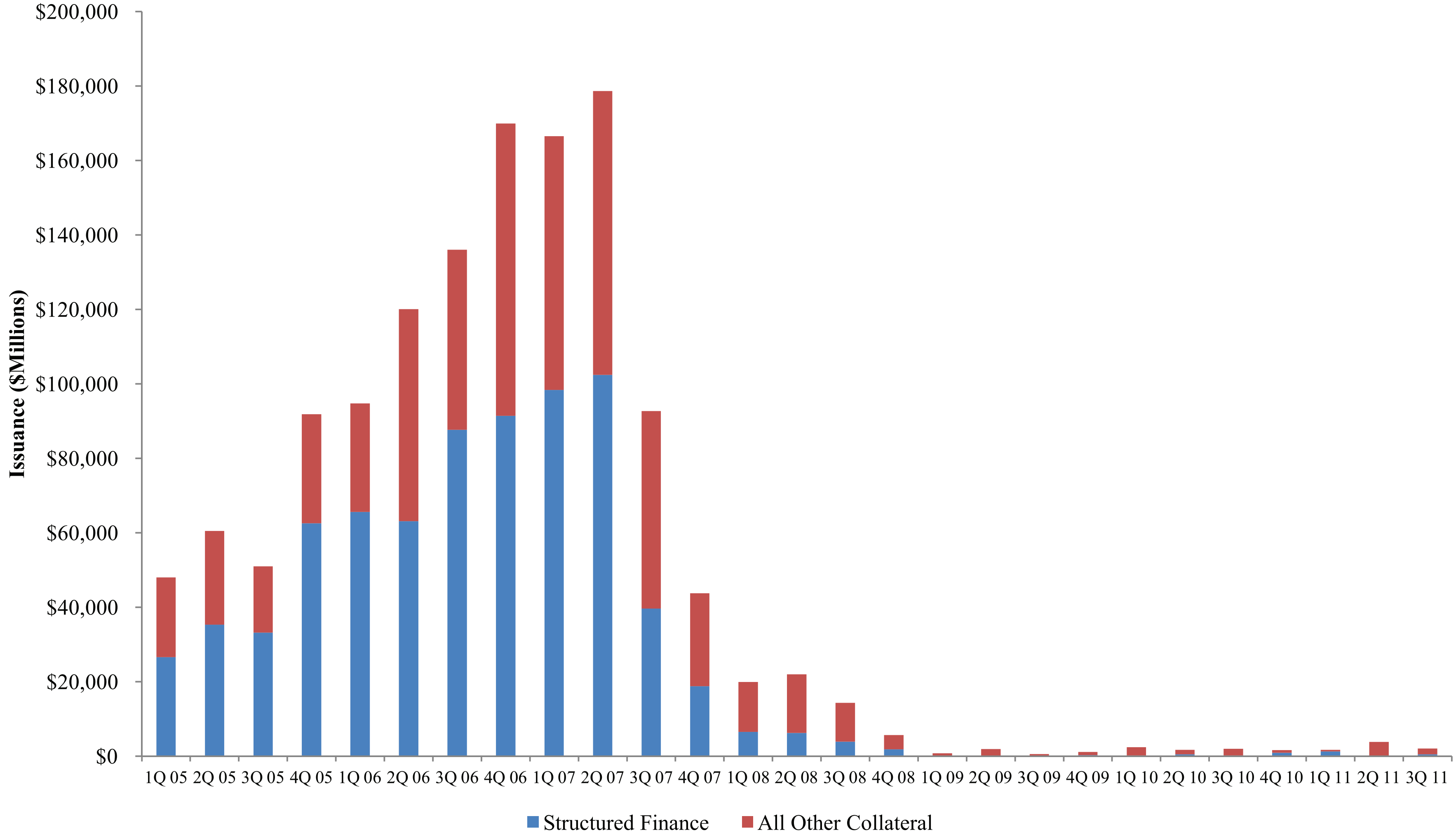
Note: All indexes are indexed to $100 on 01/01/2007.
Source: Markit.

Exhibit 3b. Value of $100 Invested in the ABX Series 06-2 Indexes
Q1 2007 - Q2 2008



Note: All indexes are indexed to $100 on 01/01/2007.
Source: Markit.

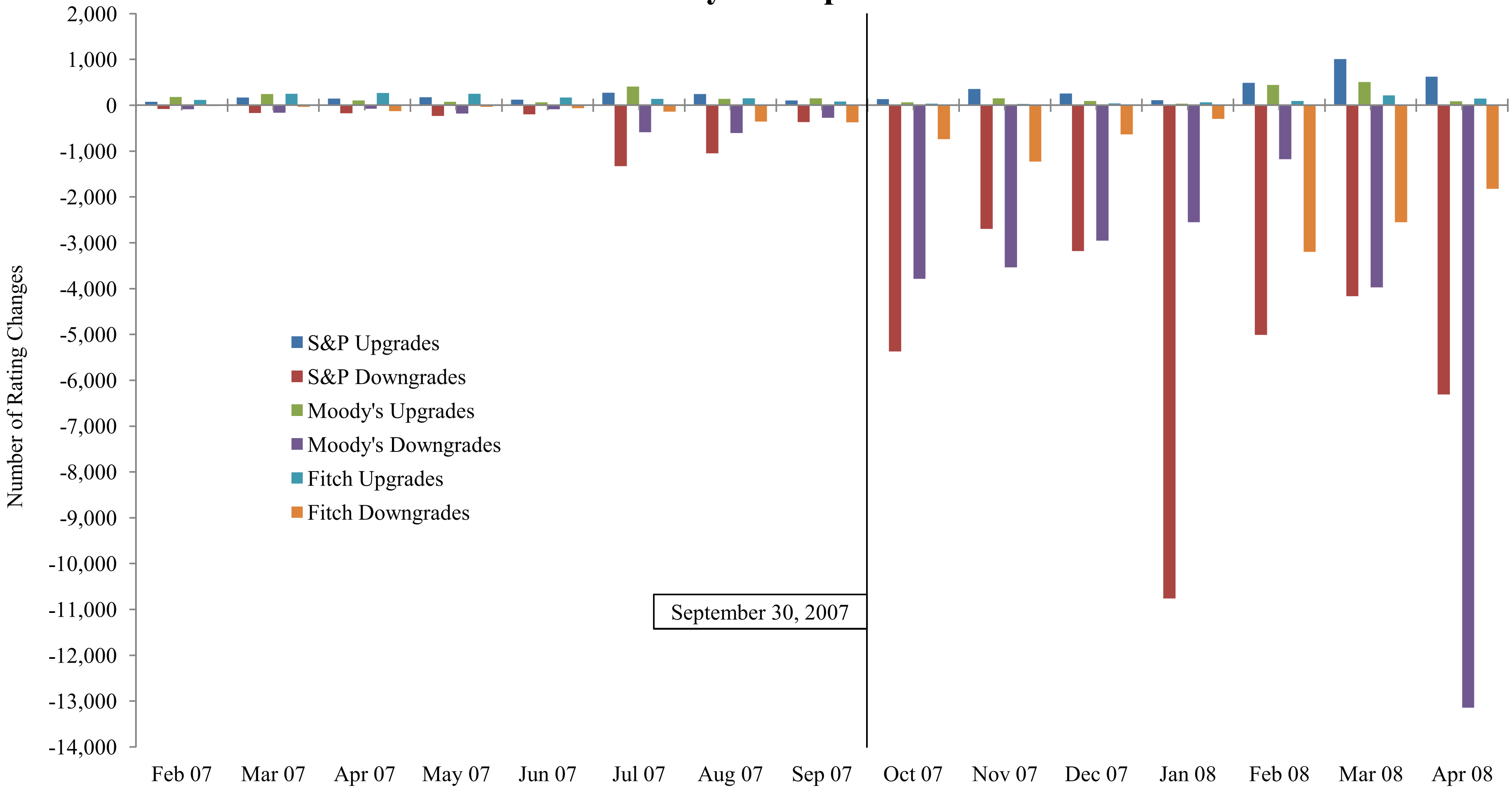
Exhibit 4. Global CDO Issuance
1Q 2005 - 3Q 2011



Note: Structured Finance Collateral includes assets such as residential mortgage-backed securities (RMBS), commercial mortgage-backed securities (CMBS), asset-backed securities (ABS), collateralized mortgage obligations (CMOs), collateralized debt obligations (CDOs), credit default swaps (CDS), and other securitized/structured products.

Source: Securities Industry and Financial Markets Association (SIFMA).

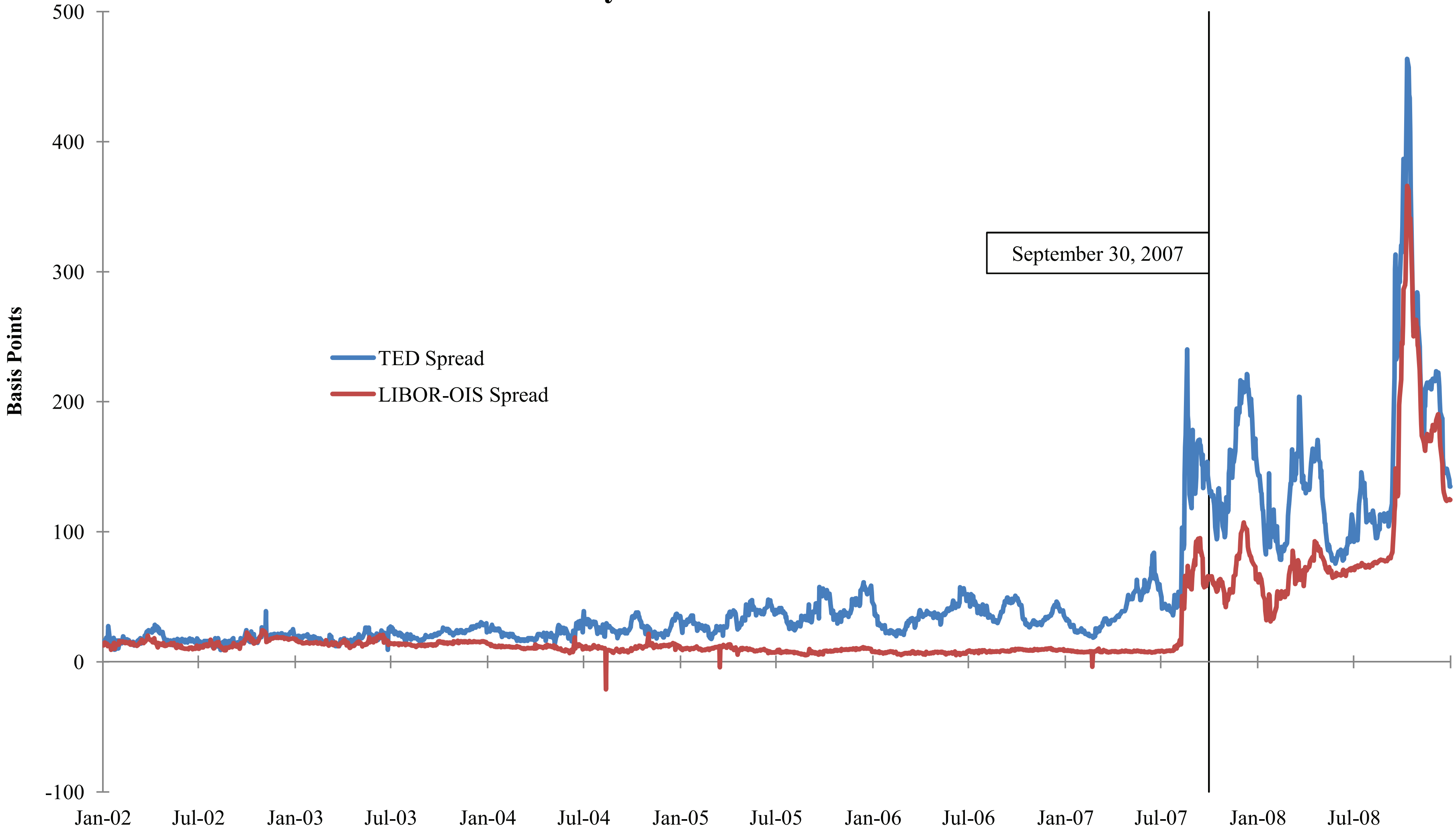
Exhibit 5. Number of Monthly U.S. Mortgage Rating Changes by S&P, Moody's, and Fitch February 07 - April 08



Note: Bloomberg reports mortgage rating changes for the following collateral types: collateralized mortgage obligations (CMOs), commercial mortgage-backed securities (CMBS), collateralized debt obligations (CDOs), and asset-backed securities (ABS) which include residential mortgage-backed securities (RMBS).

Source: Bloomberg, L.P.

Exhibit 6. TED Spread and LIBOR-OIS Spread
January 2002 - December 2008



Note: The TED spread is calculated as the difference between the three-month T-bill interest rate and three-month LIBOR. The LIBOR-OIS spread is calculated as the difference between LIBOR and the overnight indexed swap rate.

Source: Bloomberg, L.P.

Exhibit 7. Five-Year CDS Spreads for Citigroup and Competitors
January 3, 2007 - March 31, 2008

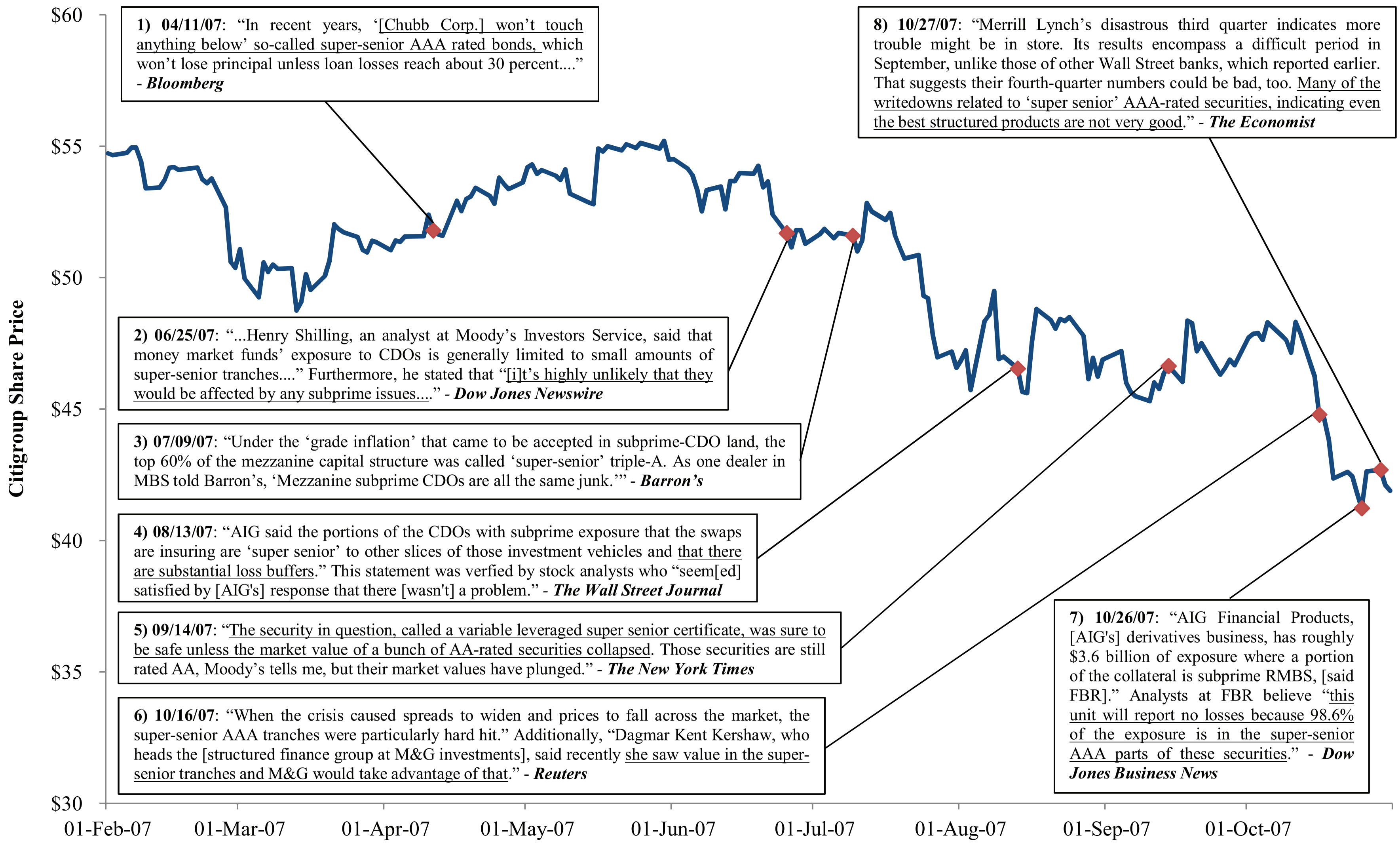
Note: Competitors is an equal-weighted index composed of Bank of America, Credit Suisse, Goldman Sachs, J.P. Morgan Chase, Lehman Brothers, Merrill Lynch, Morgan Stanley, UBS, Wachovia, and Wells Fargo.

Source: Bloomberg, L.P.

Exhibit 8. Chicago Board Options Exchange Market Volatility Index (VIX)
February 2007 - April 2008

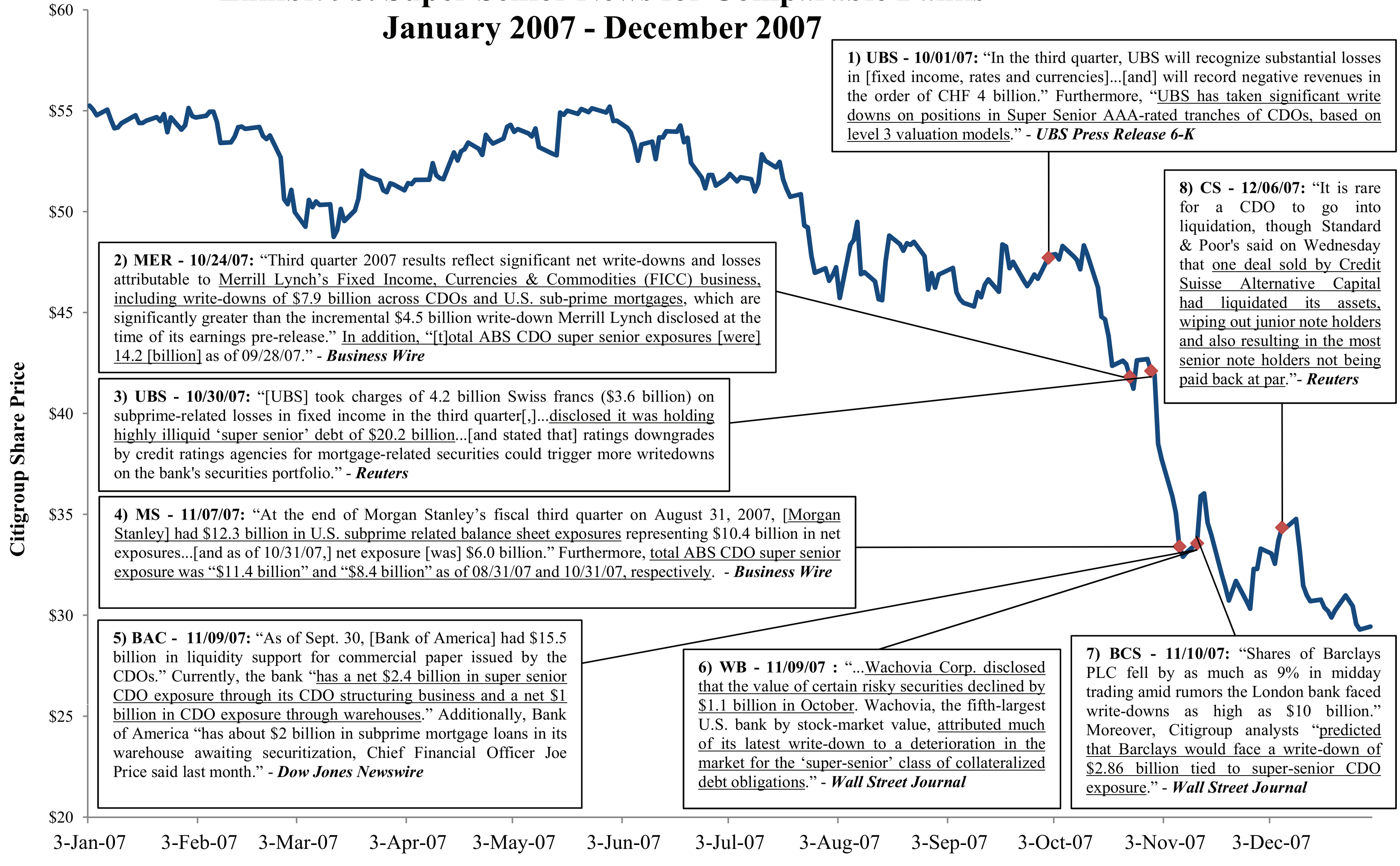
Source: Bloomberg, L.P.

Exhibit 9a. Super Senior Exposure News
February 2007 - October 2007



Sources: Bloomberg L.P., Dow Jones Newswire, Dow Jones Business News, Barron's, The Wall Street Journal, The New York Times, Reuters, and The Economist.

Exhibit 9b. Super Senior News for Comparable Banks
January 2007 - December 2007



Notes:
[1] Excluding Citigroup, the top ten banks with the largest write-downs were Merrill Lynch (MER), UBS, Morgan Stanley (MS), Bank of America (BAC), HSBC, JP Morgan (JPM), Credit Suisse (CS), Wachovia (WB), Washington Mutual (WAMUQ), and Barclays (BCS).
[2] No super senior exposure or writedown news was available for HSBC, JP Morgan and Washington Mutual during 2007.
Sources: Business Wire, Dow Jones Newswire, Reuters, UBS Press Release 10/01/2007 6-K, and The Wall Street Journal.

Exhibit 10. Citigroup Complaint Allegations on Key Dates

Complaint Date	Alleged Event	Source	Jarrell's Excess Return	Jarrell's t-stat
Panel A: Alleged Misrepresentation of Events				
02/26/07	Citigroup 2006 10-K filing date was 02/23/07 at 5:29 PM EST.	Citigroup 10-K Filing	-1.62%	**-2.44***
04/16/07	"In defendant Prince's opening remarks at an April 16, 2007 conference, he falsely portrayed Citigroup as being 'very diligent in managing our credit exposures,' among other things: '...I feel good about the composition of our portfolios, not only in the corporate and sovereign area but especially in the U.S. mortgage area where we have avoided the riskier products at some cost to revenues in prior years....'"	Complaint ¶ 836	0.72%	1.08
05/07/07	Citigroup 1Q2007 10-Q filing date was 05/04/07 at 5:21 PM EDT.	Citigroup 10-Q Filing	-0.79%	-1.19
07/20/07	"[W]e have been actively managing down our exposure for sometime. We had $24 billion in assets here at the end of 2006. It was at $20 billion at the end of the first quarter and $13 billion at the end of the second quarter while adjusting at the same time collateral and margin requirements."	2Q07 Earnings Call p.7 also see Complaint ¶ 890	0.89%	1.34
08/06/07	"[T]he August 3, 2007 Form 10-Q informed that total CDO assets as of June 30, 2007 were $74.7 billion...But this disclosure meant only that there were CDOs 'out there' with $75 billion in assets. It said nothing about the related fact that Citigroup held in excess of $55 billion of securities issued by those CDOs and backed by those assets."	Complaint ¶ 561	0.75%	1.13
10/01/07	"On October 1, 2007, Citigroup issued a press release warning that net income for the just-ended third quarter of 2007 would decline 60% from year-ago levels. The reasons Citigroup cited for this decline were: (1) a $1.4 billion writedowns of leveraged loan commitments; (2) a $1.3 billion writedowns of (a) subprime RMBS warehoused for CDO securitizations... Citigroup's CDO position was, by then, $57 billion – and no one outside Citigroup had any inkling of this fact."	Complaint ¶ 1190 - 1191	-0.08%	-0.05
10/15/07	"Still, during Citigroup's October 15, 2007 conference call, Defendants continued to misrepresent and conceal Citigroup's true subprime CDO exposure. For example, Defendant Crittenden, in discussing the $1.6 billion writedowns, stated that Citigroup's subprime exposure had been reduced to less than $13 billion."	Complaint ¶ 1198	-1.84%	-1.27
11/01/07	"On October 31, 2007, CIBC World Markets analyst Meredith Whitney...claimed, mortgage-related losses stemming from Citigroup's $180 billion portfolio of U.S. mortgage loans would be substantially greater than Citigroup had yet admitted to…."	Complaint ¶ 1203	-1.43%	-0.98

Exhibit 10. Citigroup Complaint Allegations on Key Dates

Complaint Date	Alleged Event	Source	Jarrell's Excess Return	Jarrell's t-stat
Panel B: Alleged Corrective Disclosure of Events				
11/05/07	"On November 4, 2007, Citigroup disclosed for the first time its 'net' exposure to $43 billion of super senior CDO tranches, together with an estimated writedowns of $8-$11 billion on those instruments."	Complaint ¶ 615	-4.13%	**-2.85****
01/08/08	"On January 8, 2008, Merrill Lynch analyst Guy Moszkowski issued a report concluding that Citigroup's CDO writedowns would be $16 billion, double Citigroup's November 4, 2007 representation."	Complaint ¶ 1223	0.06%	0.04
01/15/08	"On January 15, 2008 [6:30 am], Citigroup announced its financial results for the fourth quarter of 2007....disclosures included: (1) CDO writedowns of $18 billion; (2) the existence of a further $10.5 billion of subprime CDO super seniors for which Citigroup had secured purported 'hedges', primarily with the Monolines." **Negative Information Unrelated to CDO's:** "Citigroup's January 15, 2008 disclosures included:...(3) a $7.5 billion loan loss reserve provisioning charge, including (a) a "$4.1 billion increase in credit costs in U.S. Consumer primarily related to higher current and estimated losses on consumer loans", and (b) $535 million of losses from Citigroup's investment banking subprime warehouse exposures; (4) a 40% cut to Citigroup's dividend; and (5) a plan to raise $14.5 billion in capital through securities offerings. - Complaint ¶ 1224 "Citigroup eventually disclosed in its January 15, 2008 Fourth Quarter Earnings Review that the company was sitting on a "$1.5 billion commercial loans portfolio" from First Collateral Services ("FCS"), its warehouse lender." - Complaint ¶ 785 "Again, on January 15, 2008, Citigroup announced in a Form 8-K further write-downs on its leveraged loan portfolio of $205 million." - Complaint ¶ 898	Complaint ¶ 1224	-3.01%	**-2.08***
02/25/08	Citigroup 2007 10-K filing date was 02/22/08 at 5:23 PM EST.	Citigroup 10-K Filing	-3.01%	-1.72
04/18/08	"On April 18, 2008, Citigroup announced financial results for the first quarter of 2008, including further super senior writedowns of $7.3 billion."	Complaint ¶ 626	2.70%	1.60

Notes:
** 99% significance; * 95% significance.
[1] Excess returns and t-statistics for the alleged dates are obtained from Exhibit 4 of Declaration of Gregg A. Jarrell dated July 15th, 2011.
[2] In cases where filings are made after market hours, the next trading date are listed.

Sources: Bloomberg, L.P., Complaint, Declaration of Gregg A. Jarrell dated July 15th, 2011, Citigroup SEC Filings.

Exhibit 11. Analyst Commentaries on Citigroup's 4Q 2007 CDO Write-Down Estimates November 2007 - January 2008

The Buckingham Research Group, "Downgrading to Accumulate," November 5th, 2007

"In fact, we would not be surprised to see further write-downs vs. those being currently forecasted for 4Q07 given the ongoing weakness in the US housing market ...To reflect $11 billion in assumed losses in 4Q07 and another $4 billion in losses in 2008, we are lowering our 2007 and 2008 EPS estimates to $2.55 and $4.40, respectively, from $3.78 and $5.10" (page 2, emphasis added).

The Buckingham Research Group, "Announces New CEO," December 12th, 2007

"The near-term fundamentals remain challenging, with our 4Q estimate of a $1.20 per share loss the lowest on the street, reflecting higher CDO write-down assumptions … And at 1.3x book value (including our forecast of a $16 billion 4Q charge for CDOs), the stock is quite inexpensive (the lowest in 10 years), and why the Accumulate rating" (page 1&3, emphasis added).

CIBC World Markets, "Banks Current Capital Raise Efforts Only Dilute Shareholders," December 17th, 2007

"As-of 9/30/2007, Citigroup reported a net exposure to CDO super seniors and RMBS of $43 billion and $9 billion, respectively. Therefore C could take writedowns of over $16 billion at least" (page 7, emphasis added).

Credit Suisse, "Revising Estimates," January 3rd, 2008

"Considering valuation declines across the range of ABS CDO and subprime mortgage securities, we're lowering our 4Q07 estimate to a net loss of $1.35 from a loss of $0.70. This estimate figures on incremental write-downs of $16- 18 billion, versus the $12-14 billion in our prior estimate ($8-11 billion previously announced by the company; market conditions have deteriorated since)" (page 1, emphasis added).

Merrill Lynch, "C/JPM: Cutting 4QE ahead of earnings reports," January 8th, 2008

"Citi had CDO/ Subprime exposure of $55bn as of 9/30; while much of it is high-grade, we forecast C will take a $16bn mark (29%)" (page 1, emphasis added).

Exhibit 11. Analyst Commentaries on Citigroup's 4Q 2007 CDO Write-Down Estimates
November 2007 - January 2008

Bear Stearns, "Reducing Estimates on Prospect of Larger Write-Downs and Capital Raising," January 10th, 2008

"We are raising our estimate of Citigroup's write-downs from its $55 billion of subprime mortgage-related securities exposures to $16 billion from $11 billion. A report in today's Wall Street Journal that Citigroup is seeking as much as an additional $10 billion of additional capital from government investment funds from outside the U.S. suggests to us that the CDO-related write-downs could exceed even our revised estimate, and could exceed the high end of the range of published estimates of roughly $12 billion to $18 billion" (page 2, emphasis added).

Lehman Brothers, "Preview: Kitchen Sink on the Honeymoon?" January 11th, 2008

"With further deterioration in the CDO marketplace, a higher mark is likely. Sell-side expectations for 4Q07 CDO writedowns appear to be $16 billion or so, while we believe buy-side expectations are higher" (page 2, emphasis added).

Sources: Equity research reports from The Buckingham Research Group, CIBC World Markets, Credit Suisse, Merrill Lynch, Bear Stearns, and Lehman Brothers.

Exhibit 12. Analyst Commentaries and Articles on Citigroup
January 15th, 2008 - January 16th, 2008

Panel A: Higher Than Expected Loan Loss Reserve

"Jump in Citi's Credit Costs Shocks Analysts," *Financial Times,* January 15th, 2008

"What came as more of a shock, and left analysts scurrying to reassess Citi's earnings power in the future, was the big jump in credit costs to $5.4bn, which included a charge of $3.31bn to increase US consumer loan loss reserves, up from just $127m a year ago" (emphasis added).

UniCredit, "It's Not True That the Citi Never Sleeps," January 15th, 2008

"It follows that credit costs increased substantially: up by a total of USD 5.4 bn in Q4, of which USD 1.6 bn in net credit losses and USD 3.9 bn in loan loss reserves" (page 1, emphasis added).

Goldman Sachs, "Taking Its Medicine but the Illness Will Not Go Away, Lowering EPS," January 15th, 2008

"4Q2007 results included much of what we expected … However, results were much worse than anticipated due to a higher than expected reserve build in the consumer segment" (page 1, emphasis added).

"World Rides to Wall Street's Rescue," *The Wall Street Journal,* January 16th, 2008

"Citigroup surprised Wall Street yesterday by taking a $4.1 billion hit in order to set aside more money to cover possible future defaults on mortgages, home-equity loans, credit cards and auto loans -- areas in which the bank is seeing more borrowers fall behind on payments" (emphasis added).

Oppenheimer, "Citigroup Shakes Global Money Tree for Spare Change to Shore up Capital Base," January 16th, 2008

"The most disturbing trend in the fourth quarter results, in our opinion, was the rapid rise in consumer losses" (page 1, emphasis added).

Panel B: Cutting Earnings Estimates Due to Higher Credit Costs or Higher Loss Provision

Bank of America, "Capital and Credit Costs Cloud Outlook," January 15th, 2008

"We are lowering our '08 estimate to $3.00 from $3.65 on higher credit costs as well as dilution from Citi's ~$14.5b in new capital" (page 1, emphasis added).

Exhibit 12. Analyst Commentaries and Articles on Citigroup
January 15th, 2008 - January 16th, 2008

Panel B: Cutting Earnings Estimates Due to Higher Credit Costs or Higher Loss Provision (Continued)

Bear Stearns, "CDO Write-Downs & Credit Reserve Increases Drive a Wider Loss, Capital-Raising, and Dividend Cut; Cutting Estimates," January 15th, 2008

"We are lowering our 2008 EPS estimate to $3.55 per share from $4.50 per share, largely reflecting expected lower revenues from investment banking and trading and higher loss provisions in U.S. mortgages" (page 1, emphasis added).

Credit Suisse, "First Impressions," January 15th, 2008

"[H]igher expected credit costs and capital raise-related dilution takes our 2008E to $2.75 from $3.50 per share" (page 2, emphasis added).

Fox-Pitt Kelton, "4Q07 Results Poor But Actions Needed to Strengthen B/S," January 15th, 2008

"Cutting our estimates to $2.50 (from $3.75) for '08 and to $2.85 (from $4.00) for '09 due primarily to higher credit costs and dilution from capital raise" (page 1, emphasis added).

Goldman Sachs, "Taking Its Medicine but the Illness Will Not Go Away, Lowering EPS," January 15th, 2008

"Higher credit costs were the primary driver for the sequential and year over year decline in net income" (page 5).

Panel C: Other Earning Estimate Reduction

Deutsche Bank, "4Q07 Results - Lower '08 Estimates," January 15th, 2008

"Citi's $10B 4Q07 loss helps to move subprime write-downs to the later stages, but also raises issues as it relates to accelerating problems in cards, mortgage, and U.S. consumer...We believe consensus is too high ($3.68 for '08) and remain concerned about both macroeconomic and operational headwinds" (page 1, emphasis added).

Sources: Equity research reports from Bank of America, Bear Stearns, Credit Suisse, Deutsche Bank, Fox-Pitt Kelton, Goldman Sachs, Oppenheimer, UniCredit; News articles from Financial Times and The Wall Street Journal.